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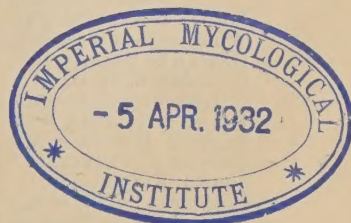
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VIRUS DISEASE CONTROL EXPERIMENTS IN BLACK RASPBERRY PLANTINGS IN 1931

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VIRUS DISEASE CONTROL EXPERIMENTS IN BLACK RASPBERRY PLANTINGS IN 1931

L. M. COOLEY AND W. HOWARD RANKIN

INTRODUCTION

Experiments were begun in 1931 on the control of virus diseases in black raspberry plantings in the intensive raspberry growing area near Brant and North Collins, Erie County, N. Y. In this section the hybrid purple variety Columbian is the most widely grown, but the combined acreage of all black raspberry varieties probably exceeds that of Columbian and the scattered plantings of red varieties. Plum Farmer has been the principal black variety grown, but two local varieties, Seneca and Black Giant, make up a considerable acreage.

The virus diseases have become more prevalent in the past few years in this district. These are destructive in black raspberries and the future of the industry is threatened. All of the five virus diseases of black raspberries have been found in this section. However, red mosaic is the only one of great importance, and it is unusually prevalent. A survey shows that very few established black raspberry plantings contain less than one-fourth affected plants and in many plantings no healthy plants are found. In most plantings, severe streak and yellow mosaic are of only slight importance. Plants affected with mild streak and leaf curl are rare.

EXPERIMENTS

The major problem under investigation is the control of red mosaic in black raspberries. In the spring of 1931, 16 coöperating berry growers obtained a total of 84,000 black raspberry plants from the Ohio Small Fruit Improvement Association. This stock was chosen because of its relative freedom from virus diseases. Twenty-two plantings were made by these growers expressly for use in these investigations. Two varieties are included, Cumberland and Plum Farmer, and the plantings represent a wide variety of conditions as to type of soil and culture, and as regards isolation from other wild and cultivated raspberries and blackberries.

Each of the 22 experimental plantings was inspected twice in 1931, and all plants affected with virus diseases were removed. Also, the surroundings of each planting were studied and mapped in an attempt to ascertain the degree and character of isolation from other raspberries and blackberries as sources of infection. The 1931 inspection periods were from July 7 to August 15 and September 9 to 29. Four inspections are contemplated in 1932.

In Table 1 is given in summary form the virus disease content of these experimental plantings in their first season as compared with the 1930 and 1931 records of those plantings in Ohio from which the stock was obtained.

TABLE 1.—A COMPARISON OF THE VIRUS DISEASE CONTENT OF THE NEW YORK EXPERIMENTAL PLANTINGS WITH THAT OF THE PARENT PLANTINGS IN OHIO.

LOCATION OF PLANTINGS	YEAR	NUMBER OF PLANTINGS	NUMBER OF PLANTS*	VIRUS DISEASED PLANTS REMOVED					
				Red mosaic		Severe streak		Total†	
				Num-ber	Per cent	Num-ber	Per cent	Num-ber	Per cent
Cumberland									
Parent plantings in Ohio‡	1930	2	21,900	15	0.07	80	0.36	109	0.49
	1931	2	24,750	14	0.06	271	1.09	295	1.19
Progeny plantings in New York	1931	14	49,337	407	0.83	89	0.18	508	1.03
Plum Farmer									
Parent plantings in Ohio‡	1930	4	2,875	2	0.07	19	0.74	23	0.87
	1931	4	2,925	13	0.44	5	0.17	19	0.65
Progeny plantings in New York	1931	8	22,270	109	0.49	4	0.02	113	0.51

*In Tables 1 and 2, the figures given in this column represent actual stands of plants.

†Including a few plants affected by yellow mosaic, leaf curl, and mild streak.

‡The Department of Botany and Plant Pathology of the Ohio Agricultural Experiment Station kindly supplied these records.

In the parent Cumberland plantings in Ohio red mosaic was present to the extent of 0.07 and 0.06 per cent in 1930 and 1931, respectively. In the 14 New York Cumberland plantings, containing 49,337 plants, 407 plants or 0.83 per cent were found affected by red mosaic. This is an increase of about 14 times in the relative number of plants affected by red mosaic. In some of the Plum Farmer plantings, increases in red mosaic were also noted. These are not

apparent from the data in Table 1 because the individual parent and progeny plantings were more variable in their red mosaic content. In Table 2, however, this trend is shown in the unsatisfactorily isolated group.

On the other hand, percentages of severe streak in the New York plantings show a decided drop from those in the Ohio parent plantings. This is probably due to the minor occurrence of severe streak in this district.

In Table 2 are given the summarized records for the occurrence of red mosaic in the experimental plantings after dividing them into three groups on the basis of the apparent degree of isolation from possible sources of infection.

TABLE 2.—EFFECT OF DEGREE OF ISOLATION FROM POSSIBLE INFECTION SOURCES OF RED MOSAIC ON THE AMOUNT OF RED MOSAIC SHOWING THE FIRST SEASON IN THE EXPERIMENTAL PLANTINGS.

ISOLATION RATING	NUMBER OF PLANT- INGS	NUMBER OF PLANTS	AFFECTED BY RED MOSAIC		TOTAL VIRUS DISEASE CONTENT*	
			Number	Per cent	Number	Per cent
Cumberland						
Satisfactory†	4	17,580	22	0.12	46	0.26
Fair†	5	17,053	66	0.39	114	0.67
Unsatisfactory§ . .	5	14,704	319	2.11	348	2.57
Plum Farmer						
Satisfactory†	3	3,421	7	0.20	7	0.20
Fair†	3	7,211	17	0.24	21	0.29
Unsatisfactory§ . .	2	11,638	85	0.73	85	0.73

*Red mosaic and severe streak, with a few plants affected by other virus diseases.

†Satisfactory isolation rating was given to plantings so situated that the nearest possible infection source of raspberry virus diseases is at least 20 rods distant.

‡Fair isolation rating was given to plantings so situated that the nearest possible infection sources existed in nearby cultivated plantings within a distance of 3 to 20 rods or diseased wild brambles in small numbers were present in the border lands.

§Unsatisfactory isolation rating was given to plantings so situated that possible infection sources existed in nearby or adjacent cultivated plantings within a few yards or diseased wild brambles were abundant in the border lands.

The amount of virus disease in the individual plantings varied more than the figures in Table 2 indicate. Of the 14 Cumberland plantings, 1 planting contained 0.09 per cent; 11 varied from 0.33 to 0.97 per cent, and the remaining 2 contained 1.67 and 3.16 per cent, respectively. Of the 8 Plum Farmer plantings, 2 showed no diseased plants, 5 varied from 0.25 to 0.56 per cent and 1 had 1.57 per cent virus disease content.

DISCUSSION OF 1931 RESULTS

An invasion of the red mosaic virus from outside sources is indicated in most of the experimental plantings. Except in a few plantings, the amount of infection was not serious. The infection source or sources, in most instances, were tentatively traced to diseased wild or cultivated raspberries in the vicinity. Red raspberries, both cultivated varieties and escaped seedlings, within 50 feet and affected by red mosaic, functioned in eight instances as infection sources to the nearby healthy black raspberries. Invasions of red mosaic from diseased purple and black raspberry plantings were indicated but were not pronounced. Wild red raspberry plants which had escaped from cultivated plantings into bordering woodlands and fence rows were found to be the most damaging of all wild brambles. In some of the experimental plantings the source of red mosaic invasion seemed to be traceable to nearby cultivated Columbian plantings, showing the "mild mosaic" typical of this variety. The identity of "mild mosaic" in Columbian and other hybrid purple varieties with red mosaic has been indicated previously but not proved.

The control of virus diseases in black raspberries in western New York will probably depend more on the proper isolation of plantings from diseased raspberries than on any other factor. It can scarcely be hoped to keep the disease content within low limits by any system of inspection and removal of diseased plants unless the rate of invasion is reduced by isolation. This is particularly true for the red mosaic virus due to its present prevalence in the district. The experimental plantings in one or two more seasons should indicate clearly the most menacing sources of infection and the degree of isolation required.

